

1 WHAT IS CLAIMED IS:

2 1. A rear gate opening and closing apparatus for
3 automatically opening and closing a rear gate of a vehicle, said
4 rear gate pivotally connected at the upper end thereof with a
5 vehicle body so as to swing upward and downward, comprising:

6 a power source means for producing a power to actuate
7 said rear gate;

8 a slider for transforming said power into a
9 reciprocating motion and traveling in the longitudinal direction
10 of said vehicle;

11 a hinge arm provided at the upper end of said rear gate
12 for pivotally connected with said vehicle body;

13 a connecting rod for interlocking between said slider
14 and said hinge arm and for transmitting said reciprocating motion
15 to said hinge arm;

16 a mounting base for supporting said power source means
17 and said slider;

18 a mounting base installing means for detachably
19 installing said mounting base in a space formed by a rear rail,
20 a side rail and an under roof of said vehicle; and

21 a gas stay extending in the longitudinal direction of
22 said vehicle, provided between said side rail and said hinge arm
23 and disposed at approximately the same height as and in parallel
24 with said connecting rod for biasing said rear gate in an opening
25 direction.

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2 2. The apparatus according to claim 1, wherein

3 said mounting base is partly installed on a brace

4 extending in the transverse direction of said vehicle.

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6 3. The apparatus according to claim 1, further

7 comprising;

8 a clutch means for disconnecting said power source

9 means with said slider so as to enable an operator to open or

10 close said rear gate by hand.

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12 4. The apparatus according to claim 1, further

13 comprising;

14 a position detecting means for detecting a position

15 of said rear gate and for outputting a detection signal thereof;

16 an operating means for operating an opening and closing

17 motion of said rear gate; and

18 a control means for automatically opening and closing

19 said rear gate based on an operating signal from said operating

20 means.

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22 5. The apparatus according to claim 4, wherein

23 said control means controls an opening and closing

24 speed of said rear gate based on said detection signal from said

25 position detecting means.

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2 6. The apparatus according to claim 4, wherein
3 said control means controls an opening and closing
4 speed at a speed determined beforehand so as to assist the rotation
5 in an opening direction when said rear gate is in a self closing
6 zone and to restrict the rotation in an opening direction when
7 said rear gate is in a self opening zone.

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9 7. The apparatus according to claim 4, wherein
10 said control means controls an opening and closing
11 speed at a speed determined beforehand so as to rotate the rear
12 gate in a closing direction against a biasing force of said gas
13 stay when said rear gate is in a self opening zone and to restrict
14 the rotation in a closing direction when said rear gate is in
15 a self closing zone.

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17 8. The apparatus according to claim 4, wherein
18 said control means judges a fully opened or closed
19 condition of said rear gate based on said detection signal.

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21 9. The apparatus according to claim 4, wherein
22 said control means judges a fully opened or closed
23 condition of said rear gate based on a load of said power source
24 means.

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1 10. The apparatus according to claim 4, wherein
2 said apparatus has a warning means for raising an alarm
3 during the opening and closing operation of said rear gate.
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5 11. The apparatus according to claim 4, wherein
6 said control means judges whether or not the opening
7 and closing operation is performed automatically based on a speed
8 of said rear gate at which said rear gate is manually operated.
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10 12. The apparatus according to claim 4, wherein
11 said apparatus has a handle switch for manually opening
12 and closing said rear gate and said control means stops an
13 automatic operation of said rear gate based on a detection signal
14 of said handle switch and disengages said clutch.
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16 13. The apparatus according to claim 4, wherein
17 said apparatus has a latch switch for detecting a fully
18 closed condition of said rear gate and for outputting a detection
19 signal and said control means initializes said position of said
20 rear gate.